Analysis and Visualization of Monitoring Data in 3D

KosSE-Symposium
Application Performance Management
Kieker Days 2012

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Kieker Project
Outline

3D Visualization Approaches
• for Software Systems

Monitoring Concurrency
• Event-based Monitoring
• Java Thread vs. Hardware Thread
• Java Monitors (e.g., synchronized)

Approaches in the Kieker Context
• Master Thesis, Philipp Döhring (2012)
An (incomplete) overview on several different ...

3D VISUALIZATION APPROACHES
Solar Metric Visualization

3D Landscape

Vizz3D

**TraceCrawler**

Codecità

**UML-City**

Vizz3D Cities

EvoSpaces

VizzJava City & VizzAspectJ City

ScyscrapAR

**CodeTrees**

An Overview on Further 3D Software Visualizations

An (incomplete) overview on aspects of ...

MONITORING CONCURRENCY
Event-based Monitoring (kieker.*.flow.* packages)

- Replaces OER
  - Modular
  - Extensible
- Sub-Traces
  - split event
  - join event
- “Annotations”
  - e.g., object-ids
Java Threads vs. Hardware Threads

• The **CPUID** x86 processor instruction
  – Query information on processor
  – Get currently executing (logical) core

• Java Native Interface (**JNI**) required
  – System specific library required
  – Additional overhead for JNI calls

• Specific event-based records
  – inserted into trace
  – periodically polled
Java Monitors (e.g., synchronized)

• Java Monitor
  – Mutual exclusion of access
  – 3 states for each call: request / entry / exit

• Instrumentation using AspectJ
  – Support with -Xjoinpoints:synchronization
  – Probes: @Before("lock()") @After("lock()") @Before("unlock()")
  – Corresponding event-based records

• Preliminary limited support: wait / notify
Runtime Visualization of Static and Dynamic Architectural Views of a Software System to identify Performance Problems

BACHELOR THESIS

CHRISTIAN WULF (2010)
DyVis — Features

• Combination of *Codecity* and *TraceCrawler*
• “Static” imported as KDM-Model
• “Dynamic” imported from Kieker log
DyVis

Ein 3D-Ansatz zur Visualisierung der Kernauslastung in Multiprozessorsystemen

DIPLOMA THESIS
BJÖRN KONARSKI (2012)
ProCity — Features

• Visualization of
  – CPU-Core usage
  – Thread assignment
**ProCity**

Visualisierung von Synchronisationspunkten in Kombination mit der Statik und Dynamik eines Softwaresystems

MASTER THESIS
PHILIPP DÖHRING (2012)
SynchroVis — Features

• Continuation of the *DyVis* approach
• Operates on event-based records
• Visualization of concurrency/synchronization
SynchroVis — Features (cont.)

Threads

Monitor

Wait/Notify
SynchroVis

Conclusions

• Existing 3D Visualization Approaches
• Kieker Monitoring Concurrency Approaches
• Three Kieker 3D Visualization Approaches

Upcoming

• Further visualizations
• Further work on monitoring concurrency
Kieker is distributed as part of SPEC® RG's repository of peer-reviewed tools for quantitative system evaluation and analysis.

http://research.spec.org/projects/tools.html

Further Reading
